THE CO-OPERATIVE UNIVERSITY OF KENYA

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY
COURSE OUTLINE

Unit Code & Name	BCSC 4126: Simulation and Modeling
Prerequisite	
Cohort	BIT & BBIT Y4 S1, September – December 2024.
Lecturer	Dr. Obuhuma James
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Purpose

The course will introduce the basic concepts of computation through modeling and simulation that are increasingly being used by architects, planners, and engineers to shorten design cycles, innovate new products, and evaluate designs and simulate the impacts of alternative approaches. Students will use a simulation software of their choice to explore a range of programming and modeling concepts while acquiring those skills. They will then undertake a final project that analyzes one of a variety of scientific problems by designing a representative model, implementing the model, completing a verification and validation process of the model, reporting on the model in oral and written form, and changing the model to reflect corrections, improvements and enhancements.

Learning Outcomes

By the end of the course, the student should be able to:

1. Grasp modeling concepts with emphasis on performance analysis.
2. Build simulation models and their parameterization.
3. Analyze simulation output data to evaluate performance criteria.

Delivery Methodology

Lectures, laboratory exercises, assignments, and projects

Learning Resources

Books, Computers, Internet

Course Contents

Period	Topic	Outline
Week 1 - 3	**1. Introduction to Simulation and Modeling**	▪ What is Modeling? ▪ What is Simulation?
Week 4 - 5	**2. Types of Simulations**	▪ Types of Simulations ▪ What Makes a problem suitable for Simulation Modeling and Analysis
Week 6	**3. Simulation Software**	▪ Examples ▪ Selection of Simulation Software
Week 7 - 8	**4. Model Development**	▪ Steps involved in Modeling ▪ Modeling Techniques
Week 9 - 10	**5. Design of Simulation Experiments**	▪ Steps involved in Simulation ▪ Simulation Techniques
Week 11 - 12	**6. Simulation Analysis**	▪ Steps involved in Simulation Analysis ▪ Simulation Analysis Techniques
Week 13 - 14	**7. Simulation and Modeling Benefits and Pitfalls**	▪ Benefits of Simulation and Modeling ▪ Pitfalls to Guard against in Simulation and Modeling

Week 1 - 14	**8. Project**	▪ Students to undertake a simulation and modeling project to be issued by the lecturer

Course Assessment

Continuous Assessment Tests			**30%**
CATs and Assignments	-	15%	
Individual/Group Project	-	15%	
End of Semester Examination			**70%**
			100%

Course Textbooks

1. John A. Sokolowski and Catherine M. Banks (Editors), Principles of Modeling and Simulation: A Multidisciplinary Approach, John Wiley & Sons, Inc, 2009.
2. Raymond J. Madachy and Daniel X. Houston, What Every Engineer Should Know About Modeling and Simulation, CRC Press, 2018.

Reference Textbooks

3. Bratley, P., B. L. Fox, and L. E. Schrage. 1987. A Guide to Simulation, Second Edition, Springer-Verlag.
4. Devendra K. Chaturvedi, Modeling and Simulation of Systems Using MATLAB and Simulink, CRC Press, 2010.
1. https://www.tutorialspoint.com/modelling_and_simulation/modelling_and_simulation_introduction.htm